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(54) EDIBLE INK FOR INK JET PRINTING

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an edible ink which is suitable for printing on food, drugs, quasi drugs, cosmetics, feed, or their containers or wrappings.

SOLUTION: This ink contains an edible colorant and an edible stabilizer selected from the group of vitamin C including an extract of a plant of the family of Myricaceae, a flavonoid substance, an org. acid, an ascorbic acid compd., an erythorbic acid compd., etc., and enables the discoloration of the colorant after printing to be prevented, characters and patterns to be distinctly printed, and the obtd. distinct print to be maintained even after printing.

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CLAIMS

[Claim(s)]
[Claim 1]Edible ink for ink jet printings containing a food color and edible stabilizer in edible ink for ink jet printings.
[Claim 2]The edible ink for ink jet printings according to claim 1 whose edible stabilizer is Chinese baybeny extract.
[Claim 3]The edible ink for ink jet printings according to claim 1 whose edible stabilizer is a flavonoid series substance.
[Claim 4]The edible ink for ink jet printings according to claim 1 whose food color is an anthocyanin pigment and whose edible stabilizer is organic acid.
[Claim 5]The edible ink for ink jet printings according to claim 4 which is one or more sorts as which organic acid is chosen from citrate, tartaric acid, and malic acid.
[Claim 6]The edible ink for ink jet printings according to claim 1 which a food color is carotenoid system coloring matter, and is one or more sorts as which edible stabilizer is chosen from ascorbic acid, erythorbic acid, ascorbic acid salts, and erythorbic acid.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field belonging to an invention] This invention relates to edible ink suitable for the ink jet printing to foodstuffs, drugs, quasi drugs, cosmetics, feed, or these container packages.

[0002]

[Description of the Prior Art]Edible ink is edible ink widely used for printing of the container package etc. which touch foodstuffs, drugs, quasi drugs, cosmetics, feed, or these directly.

It is ink which comprises an edible raw material altogether.

As a printing method to the container package etc. which touch foodstuffs, drugs, quasi drugs, cosmetics, feed, or these directly, there are methods, such as ink jet printing, gravure printing, screen-stencil, flexographic printing, decalcomania, and electrostatic printing. As the edible ink (JP,59-108078,A) characterized by including shellac resin and a food color as an example of gravure printing and flexographic printing, and an example of screen-stencil, The edible ink which emulsified water, a food color, edible oil and fat, etc. using the edible emulsifier (JP,57-179263,A), As the edible end of insoluble inorganic fine powder it has water, alcohol, a surface-active agent, and obliterating power, and stabilizer, a thickener and if needed Resin, The edible ink composition (JP,63-63363,A) containing an edible polymeric material is proposed, and these stabilizer is carrying out a role of a binder or a physical-properties improvement adjuvant in ink. However, it is difficult for that which is irregular in these printing methods, what has the soft surface, or an irregular-shaped thing to print. In these printers, in order that the substrate to which printing equipment and the printed character are stuck may contact, it cannot be said that it can print sanitarily.

[0003]Then, according to ink jet printing, it can print without contact between the substrates to which printing equipment and the printed character are stuck. Since it can print also on the surface of that irregular, what has the soft surface and the thing which breaks easily, or an irregular-shaped thing, a printing object thing is not chosen. And since it can print sanitarily, from printing of foodstuffs, drugs, quasi drugs, cosmetics, or feed, ink jet printing attracts attention.

[0004]The method of printing using the ink composition for ink jet printings which becomes foodstuffs, drugs, etc. from edible resin about the method of carrying out ink jet printing edible colorant, an aqueous solvent, and if needed is proposed (JP,60-34593,B). However, these ink has the fault that discoloration and fading occur by a photolysis,

oxidation, etc. by optical exposure. Since there is a tendency which reduces the amount of the coloring matter used and is printed thinly since nature-likeness is expressed especially these days, the degree of printing followed on becoming thin and the discoloration and fading by an optical exposure or air oxidation appeared more notably, it was dramatically difficult after printing to maintain a character and a pattern vividly.

[0005]

[Problem(s) to be Solved by the Invention]An object of this invention is to provide the edible ink which can print a character and a pattern vividly, without discoloring and fading by an optical exposure or air oxidation, even if the amount of the coloring matter used is reduced and the degree of printing becomes thin.

[0006]

[Means for Solving the Problem]Without carrying out discoloration fading by adding edible stabilizer also at an optical exposure or air oxidation, as a result of inquiring wholeheartedly that many of these problems should be solved, this invention persons find out that stable edible ink for ink jet printings is obtained, and came to complete this invention. Hereafter, it explains in detail.

[0007]With ink jet printing, printer's ink is led to a nozzle with a metal or vitreous inside diameter of around 20-100micro, It is a printing method which makes a picture draw on an impression paper which pressurized ink, injected uniform ink microscopic particles from a nozzle tip, carried out the electrostatic deflection of the ink microscopic particles with a deflecting electrode arranged ahead of a nozzle, and was left several millimeters according to a predetermined dot matrix.

[0008]It divides roughly into an ink jet printing method, and there are an acceleration oscillatory type and an electrostatic acceleration type, the former nozzle diameter is 50micro or less remarkably thinly compared with the latter, and in order to raise resolution, an ink jet with a nozzle diameter of about 20micro is also developed. Since presswork is electronically controlled as compared with other printing methods, an operation noise is very low, and high-speed printing is possible, and also foodstuffs, drugs, paper, a plastic, metal, etc. can be freely chosen as an impression paper. Since it is a printing method directly, a plate making process has the flexibility that it is unnecessary at all and a size and a form of a character can set up freely.

[0009]Although an ink jet printing method changes with a method of a printer, or differences in performance, respectively, it needs for a solid to adhere and not to change a jet direction of ink to a part in not blocking a detailed nozzle as the important characteristic of ink for ink jet printings, and a nozzle. Not to mention the time of prolonged continuous running, this is called for also at the time of resumption of

printing of Ushiro who interrupted printing.

[0010]Severe conditions, such as viscosity, surface tension, specific conductivity, an absorption spectrum, specific gravity, fizz, cohesiveness, particle size distribution, wettability and remelting nature, an infiltration speed, and temperature stability, are required as a physical property of ink for ink jet printings. For example, it is necessary to make to set specific resistance [in / for surface tension / in / for viscosity in ordinary temperature / about 1-7 (cp) and ordinary temperature / about 25 or more dyne/cm and ordinary temperature] below to about 1500-ohmcm etc. into a physical property which can be used as ink for ink jet printings. These are the important elements in a case of influencing greatly stability, cutting distance, loading duration, or voltage of particle-izing at the time of injection of ink from a nozzle, and producing ink for ink jet printings.

[0011]It becomes edible ink for ink jet printings of this invention from edible resin and other edible additive agents a food color, edible stabilizer, an edible solvent, and if needed. As a food color said to this invention, it can choose out of publicly known coloring matter for synthetic diet, and a natural food color suitably conventionally. As coloring matter for synthetic diet, they are mentioned by tar system coloring matter, a natural-coloring-matter derivative, natural system synthetic color, etc., and, for example as tar system coloring matter, Food Red No.2, food red no. 3, Red No.40, Food Red No.102, Food Red No.104, Food Red No.105, Food Red No106, Food Yellow No.4, Food Yellow No.5, Food Blue No.1, Food Blue No.2, food red no. 2 aluminium lake, Food Red No.3 Aluminum Lake, food red no. 40 aluminium lake, As a natural-coloring-matter derivative, food yellow no. 4 aluminium lake, an edible No. 5 aluminium lake, food blue no. 1 aluminium lake, food blue no. 2 aluminium lake, etc., Beta-carotene, riboflavin, etc. are mentioned as natural system synthetic colors, such as copper chlorophyll, sodium copper-chlorophyllin, and potassium norbixin.

[0012]As a natural food color, an anthocyanin pigment, carotenoid system coloring matter, quinone system coloring matter, a flavonoid, betaine series coloring matter, monas dregs coloring matter, and coloring matter that makes other natural products the origin are mentioned. As an anthocyanin pigment, red Japanese radish coloring matter, red cabbage colour, Reddish rice coloring matter, elderberry color, cowberry color, gooseberry coloring matter, Cranberry color, salmonberry color, perilla color, cime blueberry color, Strawberry color, dark sweet cherry color, cherry color, hibiscus color, Huckleberry color, grape juice color, grape skin color, black currant color, Black berry color, blueberry color, plum color, whortleberry color, Boysenberry color, mulberry color, purple sweet potato color, purple corn color, purple yam color, raspberry color, red

currant color, loganberry color, and other anthocyanin pigments are mentioned. As carotenoid system coloring matter, annatto extract, gardenia yellow, and other carotenoid system coloring matter are mentioned. As quinone system coloring matter, a cochineal pigment, lithospermum root color, lac color, and other quinone system coloring matter are mentioned. As a flavonoid, carthamus yellow, kaoliang color, onion color, and other flavonoids are mentioned. Beet red coloring matter is raised as betaine series coloring matter. Monascus color and monascus yellow are mentioned as monas dregs coloring matter. As coloring matter which makes other natural products the origin, turmeric oleoresin, curcumin, kusagi color, gardenia red, Spirulina blue matter, etc. are mentioned.

[0013]By mentioning vitamin-C groups, such as Chinese baybeny extract, a flavonoid series substance, organic acid, ascorbic acid, and erythorbic acid, and adding these stabilizer as edible stabilizer said to this invention, A character and a pattern can be printed vividly, without discoloring and fading by an optical exposure or air oxidation. In particular a stage or a method of adding edible stabilizer in edible ink for ink jet printings are not limited. Although an addition of edible stabilizer to edible ink for ink jet printings changes with coloring matter and it is not generally decided, it is 0.01 to 5% (it is [weight and the following] the same).

[0014]Chinese baybeny extract is an extraction ingredient by one sort which removes quality of tannin from the Myricaceae vegetation, and is chosen from an extract by water or a lower-aliphatic-alcohol system organic solvent to the carbon numbers 1-5, etc., or two sorts or more. An addition of Chinese baybeny extract to edible ink for ink jet printings is 0.05 to 1% especially preferably.

[0015]a flavonoid series substance -- flavonols (for example, quercetin and morin.) FISECHIN, others, flavones (for example, apigenin, luteolin, others), flavanones (for example, hesperitin, a naringenin, others), enzymatically modified rutin, etc. are preferred, and one sort chosen from these or two sorts or more are used. An addition of a flavonoid series substance to edible ink for ink jet printings is 0.01 to 1% especially preferably.

[0016]Discoloration and a discoloration preventing effect are acquired by adding one sort or two sorts or more of organic acid to edible ink using an anthocyanin pigment as stabilizer especially. Organic acid has citrate, tartaric acid, malic acid, lactic acid, succinic acid, oxalic acid, preferred acetic acid, etc., citrate, tartaric acid, and malic acid are more preferred, and citrate is the most preferred in it. An addition of organic acid to edible ink for ink jet printings is especially preferably [about 0.1 to 5% of] suitable.

[0017]Discoloration and a discoloration preventing effect are acquired by adding as

stabilizer one or more sorts chosen from vitamin-C groups, such as ascorbic acid, erythorbic acid, ascorbic acid salts, and erythorbic acid, to edible ink especially using carotenoid system coloring matter. About 0.1 to 5% of addition is especially preferably suitable for an addition of a vitamin-C group to edible ink for ink jet printings.

[0018]As an edible solvent, water, ethanol, glycerin, propylene glycol, and other edible solvents are mentioned, and it is used combining one sort or two sorts or more. As edible resin, shellac, gum arabic, starch, rosin ester, methyl cellulose, vinyl-acetate-resin, and others edible resin is mentioned, and it is used combining one sort or two sorts or more.

[0019]An edible additive agent of flavors, an antiseptic, a defoaming agent, bacteriostatic, a surface-active agent, etc. may be used in addition to these. Pretreatment and post-processing of heating etc. can also be performed if needed. Severe conditions, such as viscosity with edible ink for ink jet printings of this invention important as a physical property of the above-mentioned ink for ink jet printings, surface tension, specific conductivity, an absorption spectrum, specific gravity, fizz, cohesiveness, particle size distribution, wettability and remelting nature, an infiltration speed, and temperature stability, are fulfilled.

[0020]Edible ink for ink jet printings of this invention can be printed to a container package etc. which touch foodstuffs, drugs, quasi drugs, cosmetics, feed, or these directly. as foodstuffs -- a deep-fried rice cracker and a rice cracker -- starting -- Japanese sweets, such as steamed filled dumplings and a candy,. Cookie, a biscuit, a cracker, a pie, a sponge cake, sponge cake, A doughnut, a waffle, a cream puff, chocolate, chocolate confectionery, A caramel, a candy, chewing gum, a pudding, jelly, a hot cake, Snack confectionery, such as various Western-style cakes, such as bread, potato chips, a puff snack, and pretzel, Dairy products, such as ice cream, such as ice cream, a Popsicle, and sherbet, and a cheese head, Foodstuffs, such as fish-and-shellfishes products, such as meat products, such as a ham, a sausage, bacon, and a dry sausage, fish ham, fish sausage, boiled fish paste, a fishcake tube, a light, puffy cake made of ground fish, and tempura, or a dried food of those, are mentioned. Besides the above-mentioned foodstuffs, a lactic acid drink, lactic acid bacteria beverage, thick lactic acid drink, and fruit-juice drink, A carbonated drink containing a non-fruit-juice drink, a pulp drink, a functional beverage, a transparent carbonated drink, and fruit juice, Fancy drinks, such as soft drinks, such as a fruits coloring carbonated drink, wine, wine soda, Soybean processed foods, such as alcoholic beverages, such as liqueur and a cocktail, and soybean milk, Marmalade, jam, conserve, syrup ** of fruits, a flower paste, pastes, such as a peanut paste and a fruit paste, -- it is for obtaining -- those picked fish guts. A container package to foodstuffs, such as various seasonings, such as flatfish, such as food boiled

down in soy, extempore curry, and retort curry, catsup, mayonnaise, etc. which are made from various dainties, such as a dried food of a shellfish, a paste, small fish, shellfish, dried cuttlefish, vegetables, wild grass, a mushroom, kelp, etc., various range foodstuffs, and frozen foods, is mentioned.

[0021]Container packages, such as a tablet, a capsule, gauze, a mask and a tablet, a capsule, drinkable preparations, troches, a gargle, toothbrushing, a mouth deodorant, a ozostomia inhibitor, a skin lotion, a cream kind, and a lip stick, are mentioned as an example of drugs, quasi drugs, and cosmetics. As feed, pet food, such as cat food and dog food, food of an appreciation fish, food of a farmed fish, and livestock feed are mentioned, for example.

[0022]As a container package, a package insert etc. which paper, a plastic, a poly bottle, an aluminum can, a steel can, gauze, a mask, a powder paper, notes, etc. wrote are mentioned.

[0023]

[Example]Next, the edible ink for jet printing of this invention shows an example to the stability of an impression paper, and explains that higher efficacy is shown to it in detail. In the inside of an example "part", a weight section is shown.

[0024]After adding 10 kg of methanol to 1 kg of grinding things of the example 1 bayberry bark dry matter and extracting at about 60 ** for 5 hours, it filtered, 3 kg of methanol washed residue, and about 10 kg of methanol extracts were obtained. It moved to another container after condensing this extract, reduced pressure drying was carried out by degree-of-vacuum 5mmHg and 60 ** of bath temperature, and the yellow solid 250g was obtained. After grinding the obtained solid, after being suspended with the water 5L at the room temperature, it filtered, and the water 5L washed the remaining solid. Subsequently, Chinese baybeny extract 130g which consists solid content of a solid of reduced-pressure-drying ******** by degree-of-vacuum 5mmHg and 80 ** of bath temperature was obtained.

[0025]

Kaoliang color three-copy Chinese-baybeny-extract one-copy gum arabic two-copy ethanol 20-copy ion exchange water 74 copies. By the formula of the ---------- -- meter 100-copy above, it agitated and dissolved enough, it filtered, and the edible ink for ink jet printings using a flavonoid was prepared. This ink and the ink in which Chinese baybeny extract is not contained by the above-mentioned formula were prepared, and it was considered as the contrast article. Ink jet printing was carried out to the gelatine capsule as an impression paper, the exposure of 8 hours by an ultraviolet-rays carbon arc fading-test machine was performed, and the fading rate of

ink was evaluated as compared with the reference standard which is not glaring visually.

[0026]

[Table 1]

	退色率
本発明品（ヤマモモ科植物抽出物添加）	１０～１５％
対照品（ヤマモモ科植物抽出物無添加）	６０～６５％

[0027]Compared with a contrast article, the Chinese-baybeny-extract addition article which is this invention article has a discoloration preventing effect, and it excelled in stability so that clearly also from Table 1.

[0028]Example 2 Food Blue No.1 By the formula of the enzymatically-modified-rutin one-copy ethanol 20-copy ion-exchange-water 76-copy ---------- -- meter 100-copy above, it agitated and dissolved enough, three copies were filtered, and the edible ink for ink jet printings using Food Blue No.1 was prepared. This ink and the ink in which enzymatically modified rutin is not contained by the above-mentioned formula were prepared, and it was considered as the contrast article. Ink jet printing was carried out to the mask as an impression paper, the exposure of 8 hours by an ultraviolet-rays carbon arc fading-test machine was performed, and the fading rate of ink was evaluated as compared with the reference standard which is not glaring visually.

[0029]

[Table 2]

[0030]Compared with a contrast article, the enzymatically-modified-rutin addition article which is this invention article has a discoloration preventing effect, and it excelled in stability so that clearly also from Table 2.

[0031]Example 3 red Japanese radish coloring matter By the formula of the three-copy citric acid, crystal one-copy ethanol 20-copy ion-exchange-water 76-copy ---------- meter 100-copy above, it agitated and dissolved enough, it filtered, and the edible ink for ink jet printings using an anthocyanin pigment was prepared. This ink and the ink in which citrate is not contained by the above-mentioned formula were prepared, and it

was considered as the contrast article. Ink jet printing was carried out to chocolate as an impression paper, the 8-hour exposure by an ultraviolet-rays carbon arc fading-test machine was performed, and the fading rate of ink was evaluated as compared with the reference standard which is not glaring visually.

[0032]

[Table 3]

[0033]Compared with a contrast article, the citrate addition article which is this invention article has a discoloration preventing effect, and it excelled in stability so that clearly also from Table 3.

[0034]Example 4 gardenia-yellow three-copy L-ascorbic acid one-copy ion-exchange-water 96-copy ---------- meter By the formula of the 100 copy above, it agitated and dissolved enough, it filtered, and the edible ink for ink jet printings using carotenoid system coloring matter was prepared. This ink and the ink in which L-ascorbic acid is not contained by the above-mentioned formula were prepared, and it was considered as the contrast article. Ink jet printing was carried out to the husks of the egg as an impression paper, the exposure of 8 hours by an ultraviolet-rays carbon arc fading-test machine was performed, and the fading rate of ink was evaluated as compared with the reference standard which is not glaring visually.

[0035]

[Table 4]

[0036]Compared with a contrast article, the ascorbic acid addition article which is this invention article has a discoloration preventing effect, and it excelled in stability so that clearly also from Table 4.

[0037]

[Effect of the Invention]When it prints using the edible ink for ink jet printings with stable this invention to foodstuffs, drugs, quasi drugs, cosmetics, feed, or these

container packages, there are also no worries about an optical exposure, discoloration by air oxidation, or fading, and a character and a pattern can be printed vividly.

[Translation done.]